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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
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EXAMINER	
KALLIS, RUSSELL	

ART UNIT	PAPER NUMBER
1638	5

DATE MAILED: 07/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/763,005	Applicant(s) KIRBY ET AL.
	Examiner Russell Kallis	Art Unit 1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If the period for reply specified above is less than three months, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-40 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-40 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other

DETAILED ACTION

Specification

1. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

3. Claim 19 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n).

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 21, 22, 31, and 40 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The subject matter is a reproductive unit from a transgenic plant and a cell from a transgenic plant, which are both products of nature because both "a cell" and "a reproductive unit" read upon plant material that does not contain the tDNA and thus fall within the domain of a product of nature.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-40 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to expression cassettes, cells, plants, and methods of transformation

Applicant describes a single glutamine synthetase coding sequence that was known in the art (Canton *et al.* Plant Mol. Biol. 22 (5), 819-828, 1993).

Applicant does not describe the composition or structure of other glutamine synthetase cDNAs or any nucleic acids having at least 70% sequence identity to any of the said cDNAs.

See *University of California V. Eli Lilly and Co.*, 43 USPQ2d 1398 (Fed. Cir. 1997), which teaches that the disclosure of a process for obtaining cDNA from a particular organism and the description of the encoded protein fail to provide an adequate written description of the actual cDNA from that organism which would encode the protein from that organism, despite the disclosure of a cDNA encoding that protein from another organism.

The court also addressed the manner by which genus of cDNAs might be described: "A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a

recitation of structural features common to the members of the genus, which features constitute a substantial portion of the genus." *Id.* At 1406.

8. Claims 1-40 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling only for claims limited to a plant expression cassette comprising the isolated cDNA encoding a glutamine synthetase from *Silvestris Pinus*, (as taught in Plant Mol. Biol., 1993, vol. 22, no. 5, pp. 819-828), an *Agrobacterium tumefaciens* method of transformation of hybrid *Populus tremula x P. alba* clone INRA 717 1-B4, a method for improving the nitrogen metabolism of hybrid *Populus tremula x P. alba* clone INRA 717 1-B4 by transformation with glutamine synthetase from *Pinus sylvestris*, and the transformed plant thereof, does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

Applicant claims a plant expression cassette comprising a glutamine synthetase coding sequence, a method of making a transgenic plant with improved nitrogen metabolism by transformation with an expression cassette comprising a glutamine synthetase coding sequence, and transformed plants thereof having a significantly greater growth rate, protein content, chlorophyll concentration, and leaf area. Applicant further claims said plant expression cassette wherein the coding sequence is from *Pinus sylvestris* or wherein the coding sequence is 70% identical to Genbank accession number X69822.

Applicant teaches construction of a plant expression cassette comprising the glutamine synthetase coding region from *Silvestris Pinus*, as published in Plant Mol. Biol., 1993, vol. 22, no. 5, pp. 819-828, operably linked to CaMV 35S promoter (Example 1 page 25), a method of making a transgenic plant with improved nitrogen metabolism by transforming the hybrid

species *Populus tremula x P. alba* clone INRA 717 1-B4 with said expression cassette (Example 1 page 26). Applicant teaches that the transgenic plants have significantly greater height, protein content, chlorophyll concentration, and leaf area after six months of greenhouse growth (Example 2 pages 34-35, Tables 1-2).

Applicant does not teach construction of plant expression cassettes comprising a glutamine synthetase coding sequence other than the glutamine synthetase coding sequence from *Pinus sylvestris*, as published in Plant Mol. Biol., 1993, vol. 22, no. 5, pp. 819-828, a method of making a transgenic plant with improved nitrogen metabolism by transformation with an expression cassette comprising a glutamine synthetase coding sequence from *Pinus sylvestris* other than transgenic hybrid species *Populus tremula x P. alba* clone INRA 717 1-B4, and transgenic plants having a significantly greater growth rate, protein content, chlorophyll concentration, and leaf area other than transgenic hybrid species *Populus tremula x P. alba* clone INRA 717 1-B4. Also, Applicant does not teach a method of increasing growth other than height.

Isolation of gene homologues from different plants is highly dependent upon knowledge of conserved regions and requires significant guidance with respect to the probes, primers, hybridization and wash conditions and/or PCR reaction conditions (Noir *et al.* in MGG, 2001, 265, pp. 654-662). For example, the sequence homology among members of the NBS disease resistance gene family was too low to allow for detection by cross hybridization (Noir *et al.* in MGG, 2001, 265, pp. 654-662, page 655, column 1, lines 11-13) and was possible only by knowledge of conserved regions of DNA that would allow for PCR amplification of NBS homologues using degenerate primers (page 655, column 1, lines 13-20). This example

illustrates the problem for one of skill in the art when isolating homologous DNA sequences when there is a dearth of sequence information available.

Based on the unpredictability in the art, the limited guidance set forth in the specification, and the breadth of the claims, one of average skill would have to resort to undue experimentation to work out hybridization conditions or PCR conditions to test PCR primers required to practice the invention to the extent set forth in the claims. One would be required to test a large range of hybridization conditions across a broad range of species to isolate the glutamine synthase genes required to practice the invention.

Further, the unpredictability in transformation of the genus *Populus* and woody perennial species in general using disarmed *Agrobacterium tumefaciens* is elaborated by Han *et al.* (Can. J. For. Res. 27: 464-470, 1997); Specifically, Han notes a requirement for genotype specific culture conditions customized to promote cell competence for regeneration (page 464 column 2, lines 1-25).

Considering the absence of guidance provided for transformation of all woody perennial species as broadly set forth in the claims, undue trial and error experimentation would be required to screen through the multitude of combinations of media components and conditions for regeneration of each and every woody perennial species, notably the *Salicaceae* family and genus *Populus*, encompassed by the scope of the claims to find regeneration conditions that would successfully regenerate a woody perennial species transformed with disarmed *Agrobacterium tumefaciens*.

Lastly, Applicant only provides guidance for methods of increasing plant height, not all types of plant growth as broadly claimed. In the absence of such guidance, the scope of the claims should be limited to methods of increasing plant height

Given the lack of guidance for isolating DNA sequences encoding glutamine synthetase, sequence data for a *Pinus sylvestris* glutamine synthetase cDNA, and methods for transformation of a divergent number of plant species using *Agrobacterium tumefaciens* in the specification that reflect the breadth of the claims, and the unpredictability in the art, undue trail and error would be needed to practice the invention. Therefore, the invention is not enabled for the scope set forth in the claims.

9. Claims 17, 30, and 39 rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

It is apparent that the hybrid Popular (*Populus tremula x P. alba.)* clone INRA 717 1-B4 is required to practice the claimed invention. The specification does not provide a repeatable method for obtaining said clone and it does not appear to be readily available material. Without a publicly available deposit of the above, one of ordinary skill in the art could not be assured of the ability to make the hybrid Popular clone in the same manner as claimed. Given the lack of guidance in the specification and inability of those in the art to reproduce specific clones of the hybrid Popular clone, it would require undue experimentation for one skilled in the art to identify and obtain the starting material for transformation. If it is not so obtainable or available, the enablement requirements of 35 U.S.C. 112, first paragraph, may be satisfied by a deposit of

hybrid Popular (*Populus tremula x P. alba.)* clone INRA 717 1-B4. See 37 CFR 1.802.

Deposit of hybrid Popular (*Populus tremula x P. alba.*) clone INRA 717 1-B4 would satisfy the enablement requirements of 35 U.S.C. 112, first paragraph.

If a deposit is made under the terms of the Budapest Treaty, then an affidavit or declaration by applicants or someone associated with the patent owner who is in a position to make such assurances, or a statement by an attorney of record over his or her signature, stating that the deposit has been made under the terms of the Budapest Treaty and that all restrictions imposed by the depositor on the availability to the public of the deposited material will be irrevocably removed upon the granting of a patent, would satisfy the deposit requirements. See 37 CFR 1.808.

If a deposit is not made under the terms of the Budapest Treaty, then an affidavit or declaration by applicants or someone associated with the patent owner who is in a position to make such assurances, or a statement by an attorney of record over his or her signature, stating that the following criteria have been met:

(a) during the pendency of this application, access to the deposits will be afforded to one determined by the commissioner to be entitled thereto;

(b) all restrictions imposed by the depositor on the availability to the public of the deposited biological material will be irrevocably removed upon the granting of a patent on this application;

(c) the deposits will be maintained in the public depository for a period of at least thirty years from the date of the deposit or for the enforceable life of the patent of or for a period of five years after the date of the most recent request for the furnishing of a sample of the deposited

biological material, whichever is longest; and

(d) a viability statement in accordance with the provisions of 37 CFR 1.807; and

(e) the deposits will be replaced if they should become necessary due to inviability, contamination or loss of capability to function in the manner described in the specification.

In addition, the identifying information set forth in 37 CFR 1.809(d) should be added to the specification. See 37 CFR 1.801 - 1.809 [MPEP 2401-2411.05] for additional explanation of these requirements.

Given the lack of guidance, the uncertain access to the cloned hybrid described in the specification, the breadth of the claims, and the unpredictability in the art, undue trail and error would be needed to practice the invention as claimed. Therefore, the invention is not enabled.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 7, 12-27, 31, and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the limitation "the glutamate synthase coding sequence" in line 2. There is insufficient antecedent basis for this limitation in the claim.

At Claim 7, line 1, "which is contains" is improper English. Also it is unclear if the nucleic acid sequence is in addition to the coding sequence of Claim 1. Amendment of the claim to recite --wherein the coding sequence is selected-- is recommended.

At Claim 7, line 10, the claim recites "at moderate stringency" which is indefinite. The term "moderate" is a relative term, hence it is not clear what the metes and bounds of the claim are.

At Claim 7, line 5, the term "identical" is indefinite. It is not clear which property of the nucleic acid sequence is identical to the Genbank listing, it could be sequence length, sequence identity, or the pyrimidine/purine distribution of the sequence.

At Claim 7, lines 5, 7, 9, and 10, the term Genbank Accession No. X69822 is indefinite because Genbank sequences can be updated. Thus it is not clear what sequence is intended.

At Claim 11, line 2, "the" should be --a--.

At Claim 12, line 2, what is meant by " transforming *in vitro*" is unclear.

At Claim 12 and 23, line 1, "improved" is indefinite because the term is relative and can also be used to describe the many different aspects of nitrogen metabolism such as improved uptake, improved fixation, improved nitrogen sink size with respect to total protein content, or increases in total glutamine synthetase activity for example.

Claim 12 recites the limitation "said plant" in line 2. There is insufficient antecedent basis for this limitation in the claim. The claim suggests transforming an already transformed plant.

Claim 18 and 19 are improperly dependent. The Claim should recite --wherein the transforming is by--.

At Claims 21, 31, and 40, line 1, "A reproductive unit" is indefinite because it is not clear, whether it refers to a seed, a flower or a sexual gameteophyte.

At Claim 25, line 2, "genes is" is improper English.

At Claim 27, the claim limitation "from the family Salicacaea" fails to further limit claim

17.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 1-11 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over van Engelen *et al.* (Transgenic Research 4, pp. 288-290, 1995) in view of Canton *et al.* (Plant Molecular Biology 22, pp. 819-828, 1993).

Applicant claims a plant expression cassette comprising a glutamine synthetase coding region operably linked to a promoter and plants transformed with said expression cassette.

van Engelen teaches a plant expression cassette comprising, a nos terminator, a CaMV 35S promoter, a neomycinphosphotransferase II coding sequence, a GUS transgene, and a pBIN19 vector comprising the cassette in (Figure 1). Van Engelen also teaches plant transformation with said cassette (Column 1 page 290 lines19-23 and olumn 2 page 290 lines 1-7).

van Engelen does not teach a glutamine synthetase cDNA from *Pinus sylvestris*.

Canton teaches a glutamine synthetase cDNA from *Pinus sylvestris* in the Abstract.

It would have been *prima facie* obvious at the time of Applicant's invention to modify the invention of van Engelen to substitute a glutamine synthetase gene from *Pinus sylvestris* as

taught by Canton for the heterologous gene in order to obtain a plant expression cassette for transformation. One would have been motivated by the teaching of van Engelen that the plant expression cassette was generally useful for any heterologous gene and improved the efficiency of transformation using *Agrobacterium*. One would have had a reasonable expectation of success of transformation of plants in view of the success of van Engelen.

14. Claims 12-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donn *et al.* (EP0303780 1989-02-22) in view of Feuiller *et al.* (Plant Molecular Biology 27, pp. 651-667, 1995).

Applicant teaches a method producing a transgenic plant with improved nitrogen metabolism by transformation with a glutamine synthetase coding region.

Donn teaches glutamine synthetase overproduction in transgenic plants transformed with CaMV-alfalfa glutamine synthetase by *Agrobacterium tumefaciens* mediated transformation, see Abstract and in example 1 page 5, lines 32-54.

Donn does not teach transformation of hybrid popular *Populus tremula x Popular alba* clone INRA 717 1-B4 with a pBIN19 vector comprising glutamine synthetase from *Pinus sylvestris*.

Feuiller teaches transformation of hybrid popular (*Populus tremula x Popular alba*) clone INRA 717 1-B4 using pBIN19/35SCaMV/nptII/nos on page 653, lines 1-5 and page 654, lines 11-18.

Canton teaches glutamine synthetase from *Pinus sylvestris* see Abstract.

It would have been *prima facie* obvious at the time of Applicant's invention to modify the invention of Donn to substitute the transformation of hybrid popular (*Populus tremula x*

Popular alba) clone INRA 717 1-B4 using pBI121-CaMV/ CaMV/NPT-II/NOS taught by Feuiller, and the glutamine synthetase from *Pinus sylvestris* as taught by Canton. One would have been motivated by the teaching of Donn that plants over expressing glutamine synthetase have improved utilization of nitrogen and are of value in nitrogen limited soils. One would have had a reasonable expectation of success of transformation of *Populus tremula x Popular alba* clone INRA 717 1-B4 in view of the success of Feuiller.

15. All claims are rejected.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Kallis whose telephone number is (703) 305-5417. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson can be reached on (703) 306-3218. The fax phone numbers for the Group is (703) 308-4242 or (703) 305-3014.

Any inquiry of a general nature or relating to the status of this application or proceeding, or if the examiner cannot be reached as indicated above, should be directed to the legal analyst, Kim Davis, whose telephone number is (703) 308-0009.

Russell Kallis Ph.D.
July 1, 2002

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